18 January 1963

MEMORANDUM FOR: Assistant Director, Scientific Intelligence

THROUGH: Chief, Offensive Systems Division, SI

SUBJECT: Discussion with [redacted] 25X1

[redacted] 25X1

1. On Wednesday, January 16, 1963, [redacted] head of 25X1
25X1 the [redacted] visited Headquarters and met with the following OSI personnel:

[redacted] 25X1

25X1 2. [redacted] was invited for the purpose of acquainting us with the work going on in his department in the area of spatial pattern recognition and cognitive systems best characterized by their automatic photointerpretation program for the Navy. Based on a series of successful experiments conducted on the Mark I Perceptron, the Laboratory is engaged in a program aimed at the design of a cognitive system of photointerpretation. In this role the automaton would scan large quantities of photographic material in search of particular features or man-made objects. As an aid to this research effort a special purpose photographic input device was developed for a digital computer. With this equipment, pictorial or graphical data can be inserted directly into the computer for analysis. Designed and
25X1 developed [redacted] this facility has permitted the establishment of a catalogue of photos stored on magnetic tape. Acoustic, as well as optical inputs, have been explored.

3. It is the feeling of those present that the work in pattern recognition described briefly above and in more detail in the enclosures should be followed up by our photo analysis people to exploit the capabilities of the system in its basic cognitive aspects for photo

SUBJECT: [redacted] 25X1

interpretation and possibly to ascertain if any potentialities exist for: the extraction of features in photographs not possible by present means; the use of computer techniques to form composites from sequential photographic coverage; and the extraction of new features within a given area between successive coverages.

4. In general, the [redacted] has five 25X1
divisions employing 1000-1200 people. It is an uncommitted, independent Laboratory operating as a non-profit corporation and is endowed with essentially across-the-board facilities in electronics, physics, aerosciences, and related areas. They also have analytical groups involved in weapon system effectiveness studies, long range military planning, and operations research.

25X1 5. The visit by [redacted] was most informative and has opened several areas of interest. He has proffered an open invitation to tour his facility or the Lab in general.

[redacted] 25X1
Chief, Air/Naval Weapons Branch, OSD/SI

Enclosures:
1. Design of a Photo Interpretation Automaton
2. Investigation of Perception Applicability to Photo Interpretation
3. Paper Perceptron
4. Input/Output Equipment for Research Applications
5. Two-Dimensional Spatial Filtering and Computers
6. Synthesis of an Optimal Set of Radar Track-While-Scan Smoothing Equations
7. 1961-1962 Report on Research

Distribution:
Orig. & 1 - fwd. 2 - O/C/OSD/SI
1 - CR/Staff/SI 2 - ANW/OSD/SI

25X1 OSI/OSD/ANW/[redacted] (18 Jan. 1963)

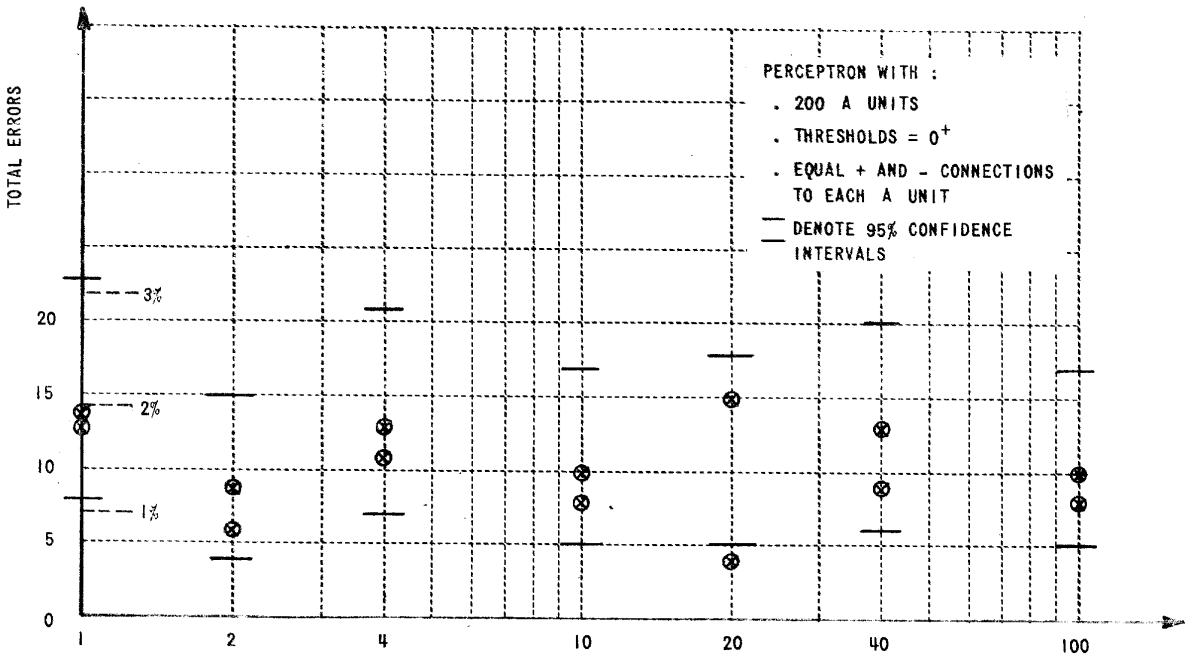
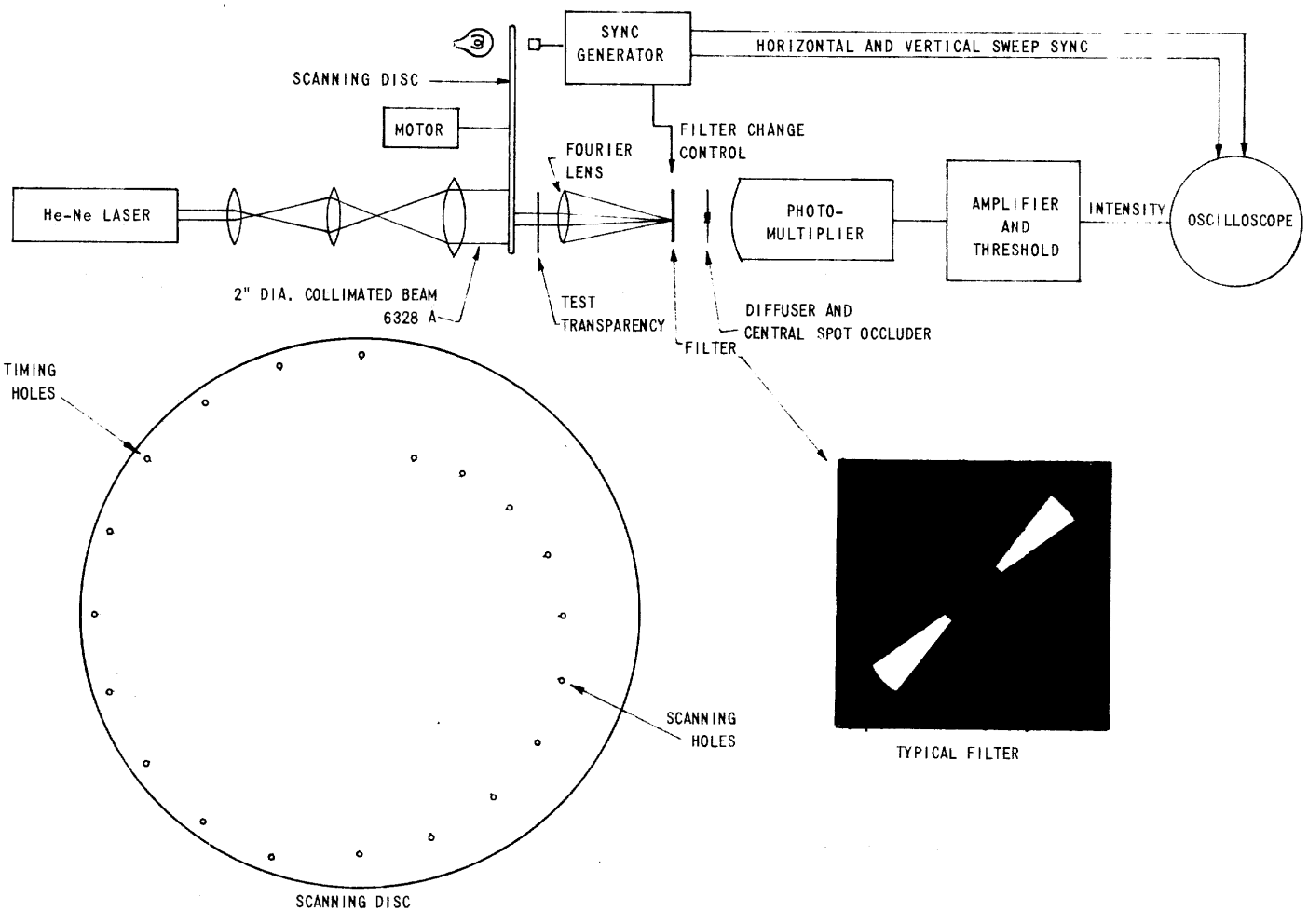
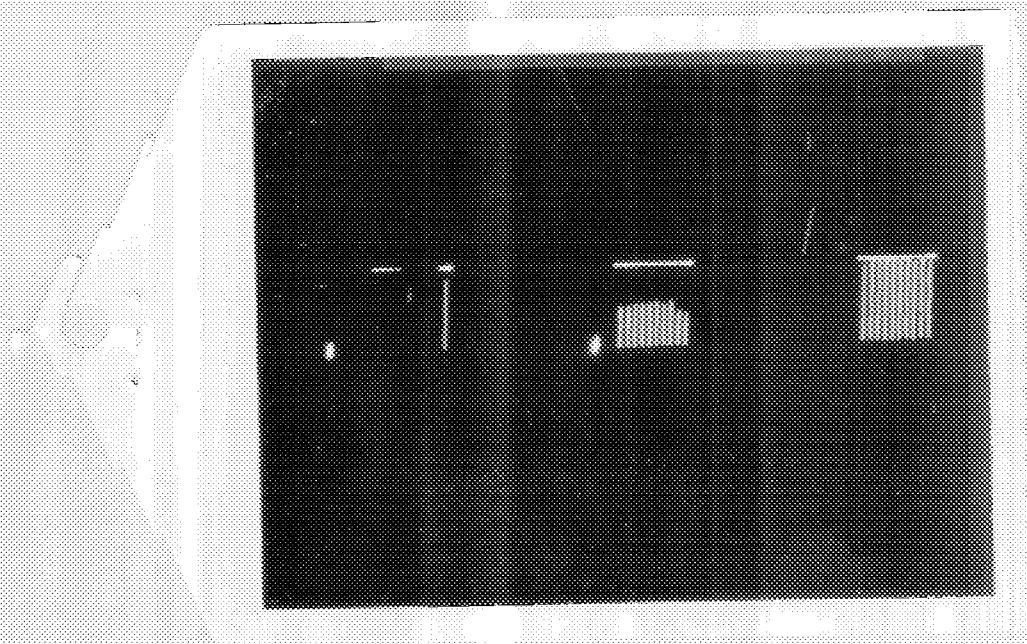


Figure 13 NO. OF + (OR-) CONNECTIONS PER A UNIT

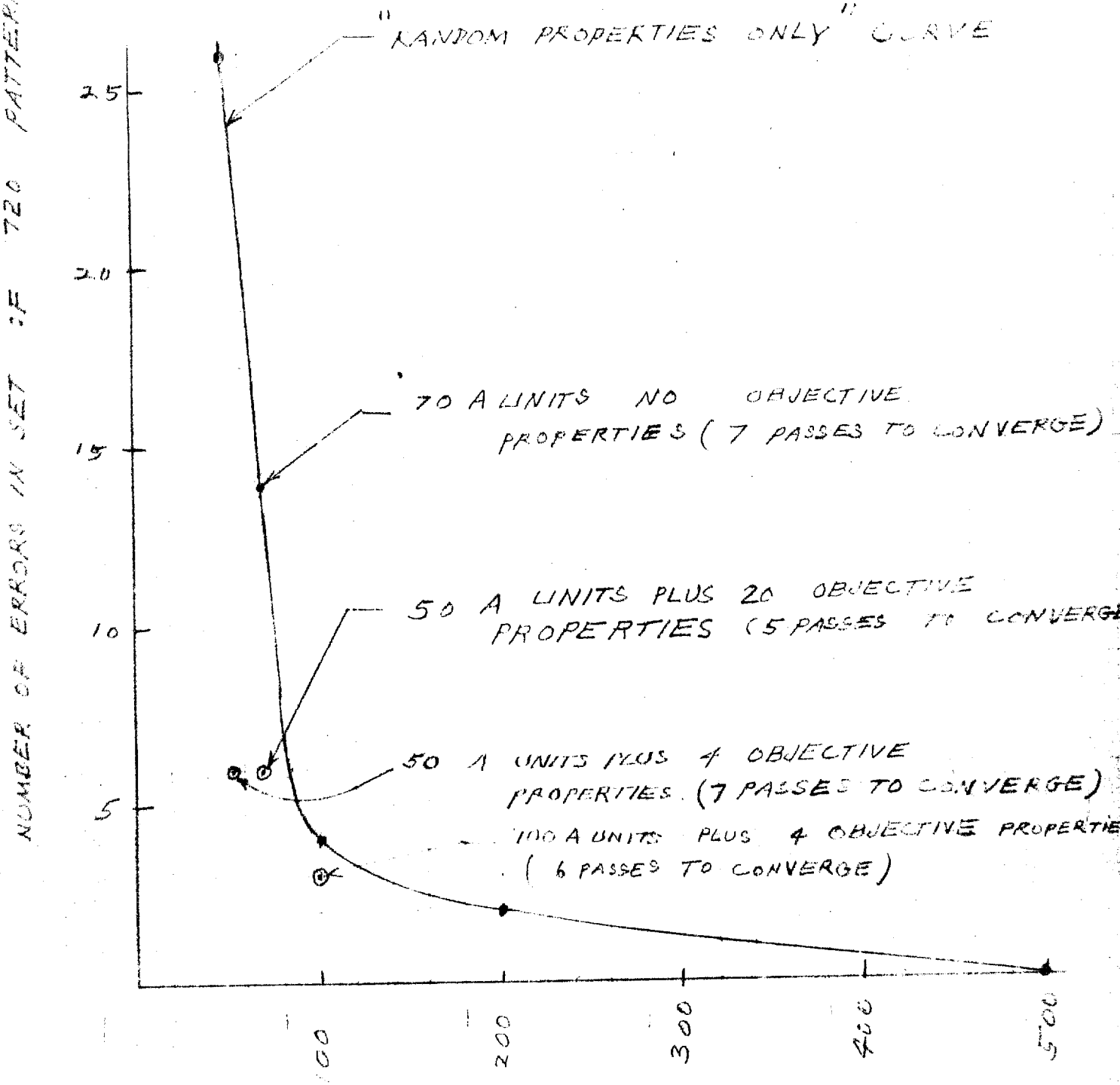


MARK III SPATIAL FILTER RECOGNITION APPARATUS EXPERIMENTAL MODEL

Approved For Release 2005/05/02 : CIA-RDP78B04770A002300030011-3

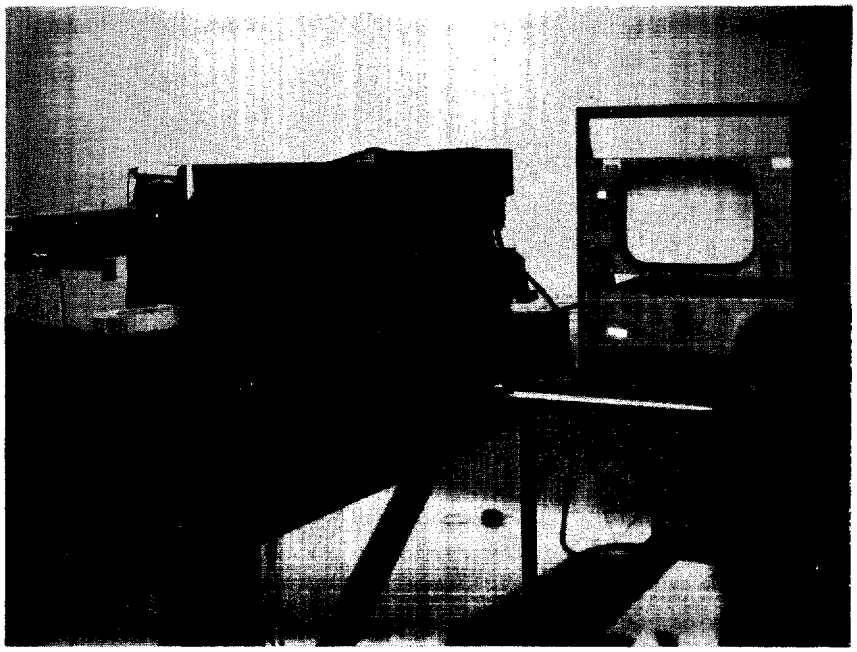


Approved For Release 2005/05/02 : CIA-RDP78B04770A002300030011-3



ERRORS VS A UNITS FOR PERCEPTRON WITH 2.0 EXCITATORY AND 20 INHIBITORY CONNECTIONS PER A UNIT.

FIGURE 1



Experimental Set-up

The optical chain includes:

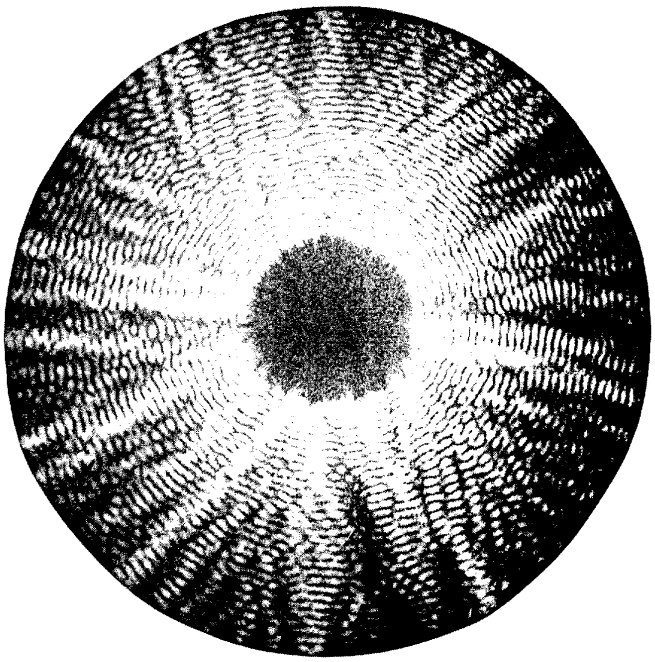
25X1

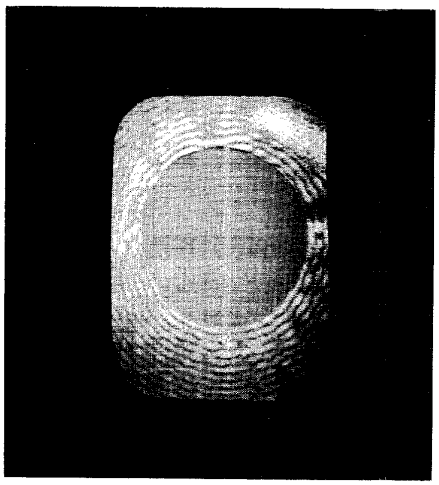
- [redacted] Model 115 gas laser (6328 Å) Hemispherical mode, 1.0 mw CW, diffraction limited, uniphase, spherical wavefront, beam diameter 3 mm.
- Object film or pinhole
- Lens
- Occluding filter
- Lens
- Vidicon and Monitor (Kintel) or film

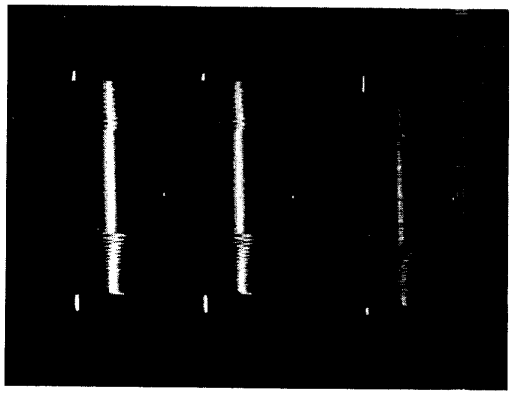
Contents

For these five objects: a pinhole, railroad yard, parking lot, field, and brush land; a 3 mm diameter laser beam illuminated a part of the object film.

Each page following contains (1) the spatial frequency plane photograph, (2) the monitor display of this plane, and (3) the video voltage signal for given lines of the monitor display.



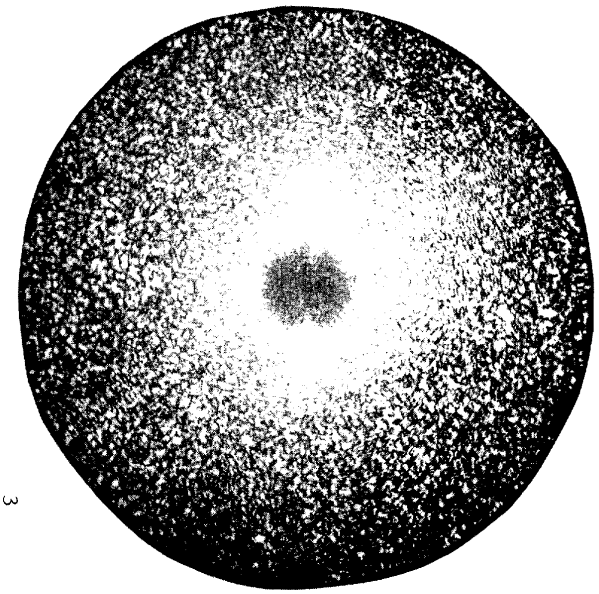


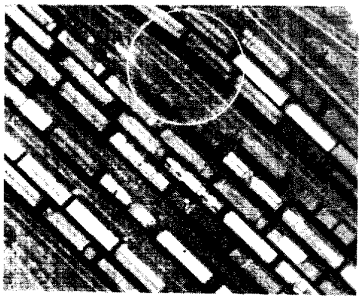


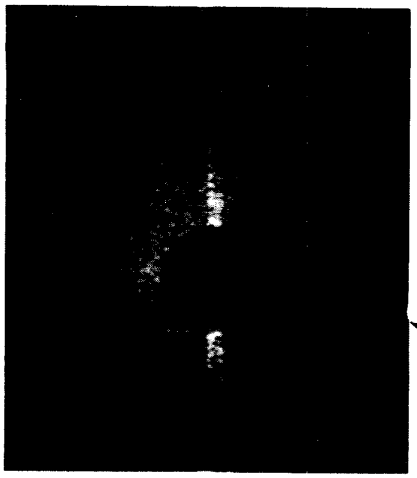
Airy rings of 1 mm pinhole

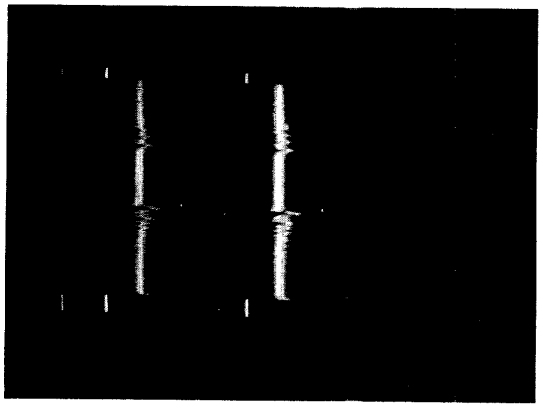
Bandpass occluding filter used in this case has central stop disc of 10.8 mm diameter and surrounding stop inside diameter of 35.5 mm; the passband is 12.6 cycles/mm to 46 cycles/mm.

All video signals shown are same center line of the raster taken at different exposures.





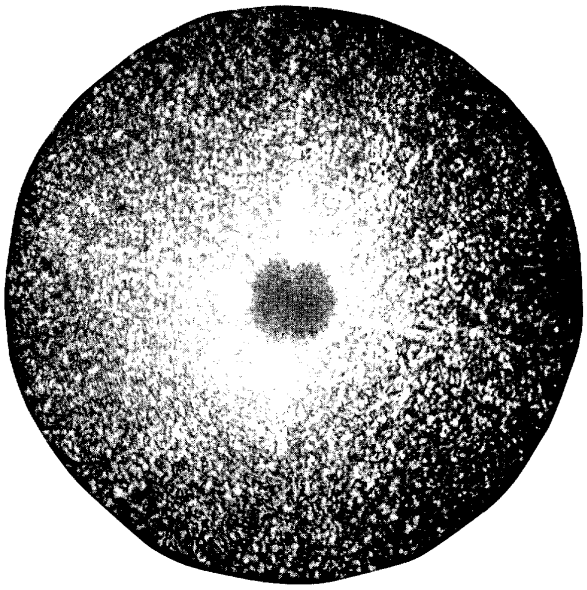


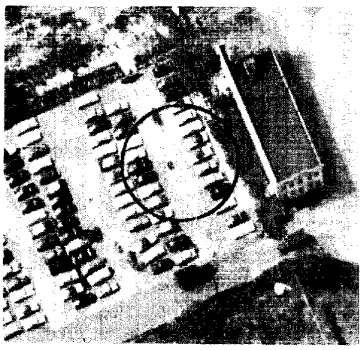


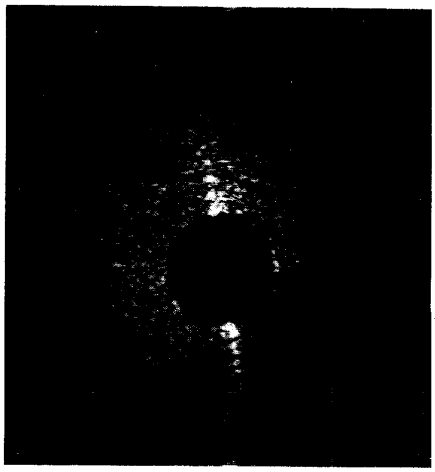
Rail yard objective film

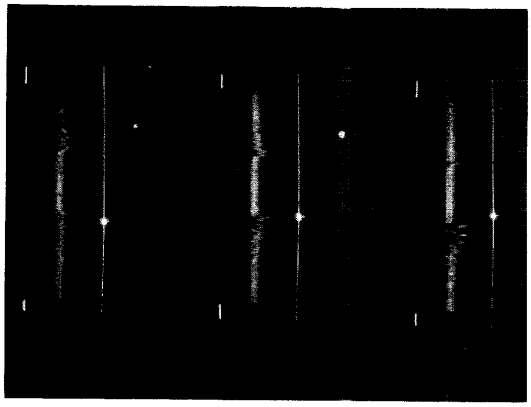
Bandpass occluding filter used here (and in all the following examples) has a central stop disc of 5.8 mm diameter and a surrounding stop inside diameter of 37 mm; the passband is 7.3 cycles/mm to 47 cycles/mm.

The video signals correspond to the raster center line.



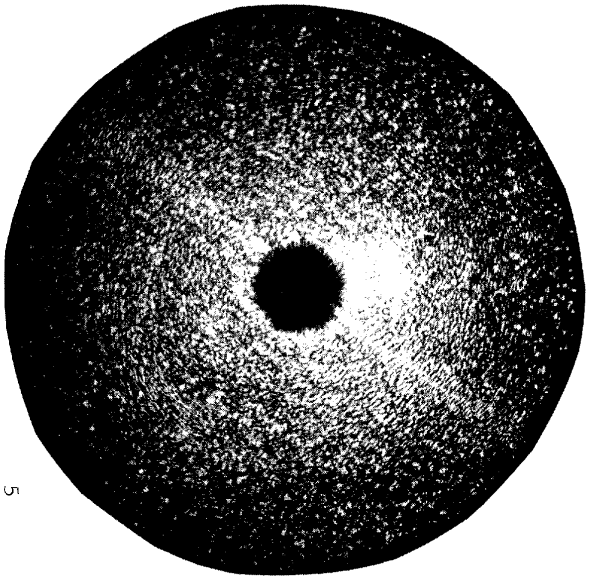


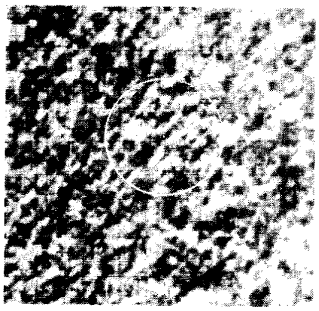


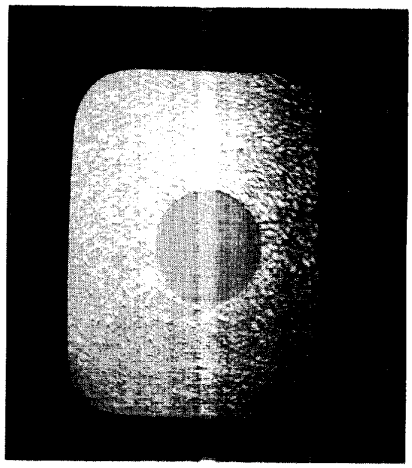


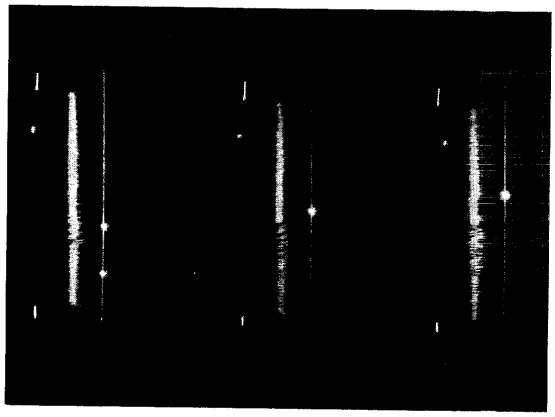
Parking lot objective film

The video signals are for three different horizontal lines near the raster center: about 25 TV lines below center, center line, and about 25 TV lines above center from print top-to-bottom.



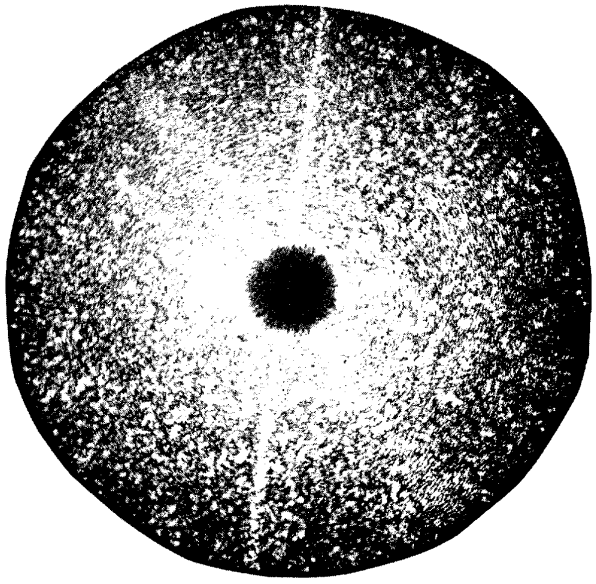


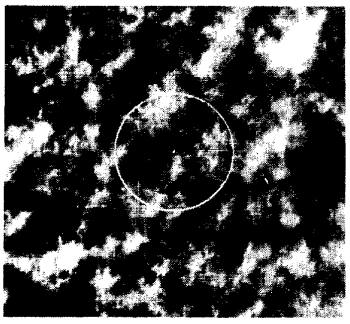


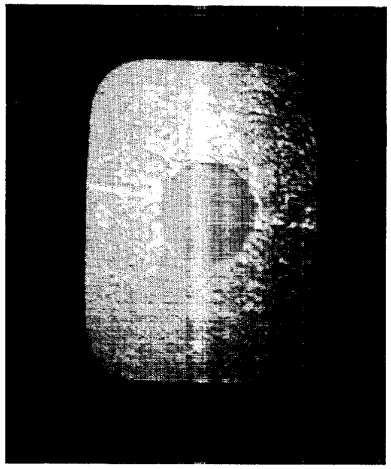


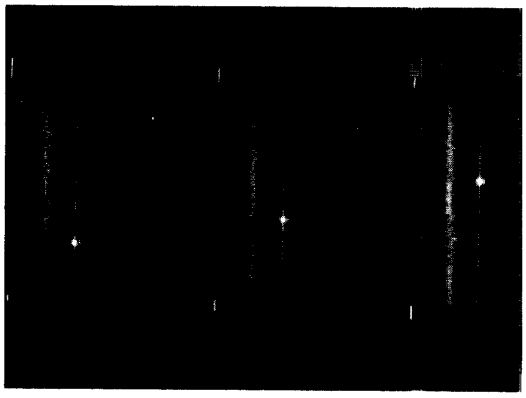
Field objective film

The video lines are, top to bottom, (1) through bottom one-quarter of occluding disc, (2) through center line, and (3) (unplanned) double exposure.









Brush land objective film

The monitor display near-vertical line may come from shadow edges apparent in the object film.

The three video lines include the raster center line and lines above and below the center by about 150 TV lines.

25X1 [redacted] 25X1

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[redacted]

Agency association is classified; work is unclassified.

[redacted] 25X1

9 May 63 5500-9701-63

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1	Study the feasibility of the extension of perception applicability to automatic photo interpretation, per para. "B Modest Program" as outlined in ltr dated 14 January 1963.	1

[redacted] 25X1

NOTE: It is understood that this contract will be handled for us by the Navy. (See attached "Technical Background Procurement Information" sheets.)